

Solving Logarithm and Exponential Equations

1. Solve $5^{x-3} = 1700$ to 2 decimal places.

2. Which step below will lead to the solution of $6^{3x+1} = 8^{x+3}$?

a) $\frac{3 \log 8 + \log 6}{3 \log 6 + \log 8}$ b) $\frac{3 \log 8 - \log 6}{3 \log 6 - \log 8}$ c) $\frac{\log 8 + \log 6}{\log 6 + 3 \log 8}$ d) $\frac{3 \log 8 - \log 6}{\log 6 + \log 8}$

3. There are 2 solutions to the logarithmic equation $\log_7(x - 3)^2 = 2$. The sum of these 2 solutions is

a) 1 b) 3 c) 6 d) 10

Use the laws of logarithms to solve the next 2 questions.

4. Solve $\log_2(11 + x) + \log_2(x - 1) = 6$, and identify any extraneous roots.

5. Solve $\log_3(2x^2 - 2x) = \log_3(x - 1) + 2$

6. Radioisotopes are used to diagnose various illnesses. Iodine-131 (I-131) is administered to a patient to diagnose thyroid gland activity. The original dosage contains 280MBq of I-131. If none is lost from the body, then after 6 hours there are 274MBq of I-131 in the patient's thyroid. What is the half-life of I-131, to the nearest day?
7. The compound interest formula is $A = P(1 + i)^n$, where A is the future amount, P is the present amount or Principal, i is the interest rate per compounding period expressed as a decimal, and n is the number of compounding periods. Danita inherits \$15 000 and invests in a guaranteed investment certificate (GIC) that earns 3.6% compounded quarterly (every 3 months). How long will it take for the GIC to grow to \$17 000?
8. The largest lake lying entirely within Canada is Great Bear Lake, in the Northwest Territories. On a summer day divers find that the light intensity is reduced by 6% for every 2 metres below the water surface. To the nearest tenth of a metre, at what depth is the light intensity 20% of the intensity at the surface?

9. Solve $\log_2 \sqrt{x+4} = \frac{5}{2}$

10. Solve for x , given $2^{\frac{x}{3}} = 18$

Use the following information to answer the next question.

Consider the following steps in solving $\log_5 x - \log_5(x - 2) = 3$

Step 1 $\log_5 \left(\frac{x}{x-2} \right) = 3$

Step 2 $5^3 = \left(\frac{x}{x-2} \right)$

Step 3 $125x - 2 = x$

Step 3 $124x = 2$

Step 5 $x = \frac{1}{62}$

11. Identify the error and determine the correct solution.

12. Given, $m \log_p n + 7 = k$, express n^m in terms of p and k .

13. When $5m^2 = k$, is expressed in log form, the result is

a) $\log_m \left(\frac{5}{k} \right) = 2$

b) $\log_2 \left(\frac{5}{k} \right) = m$

c) $\log_2 \left(\frac{k}{5} \right) = m$

d) $\log_m \left(\frac{k}{5} \right) = 2$

14. If $\log_c k = 2$, then what is the value of $\log_c \sqrt[4]{k}$?

15. If $m^2 = 10$, determine the value of c in, $\log_c (m+1) + \log_c (m-1) = 2$.